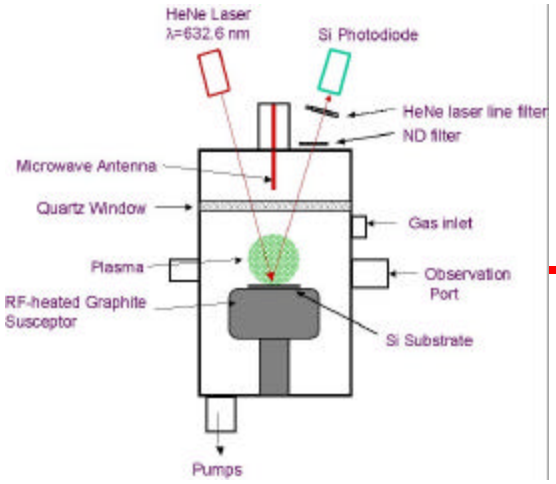
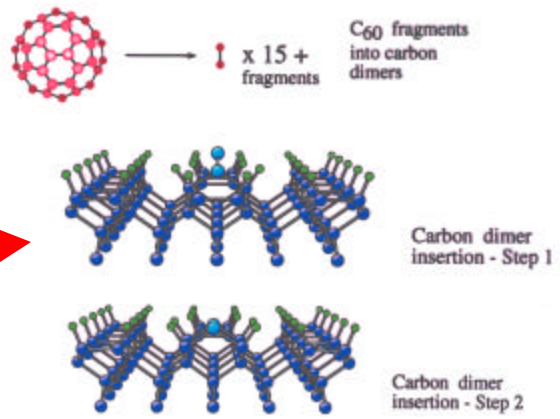
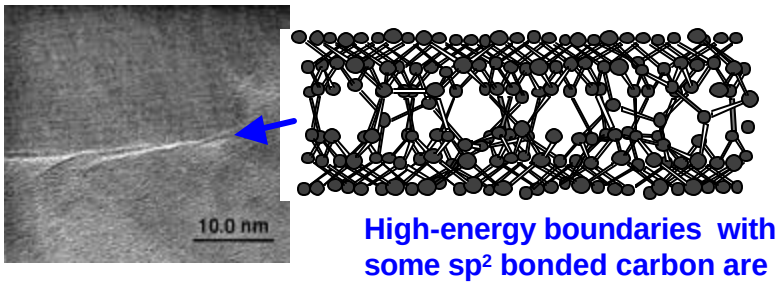
Studies of Mechanical and Tribological Phenomena in Ultrananocrystalline Diamond Thin Films



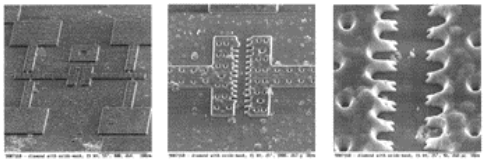




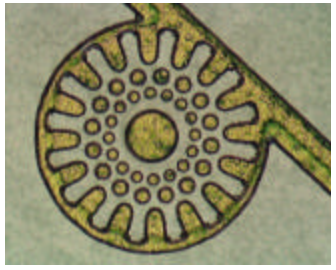
UNCD films are formed by 2-5 nm equiaxed grains and 0.2-0.5 nm grain boundaries

High-energy boundaries with some sp^2 bonded carbon are predicted by molecular dynamic simulation, providing the basis for the excellent mehanical properties of UNCD

Microwave C_{60}/Ar or CH_4/Ar plasmas are used to produce UNCD films via C_2 dimers insertion in growing film lattice

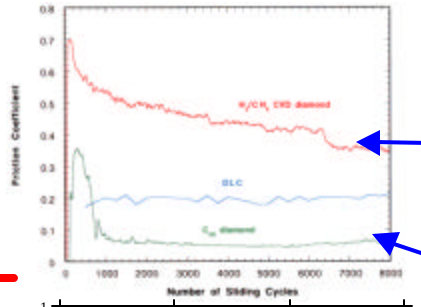


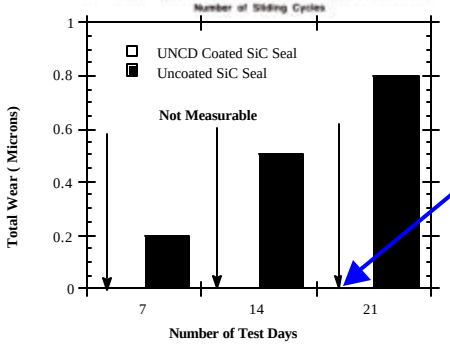
2-D UNCD MEMS gauge

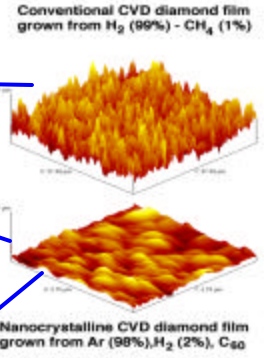


3-D UNCD MEMS microturbine

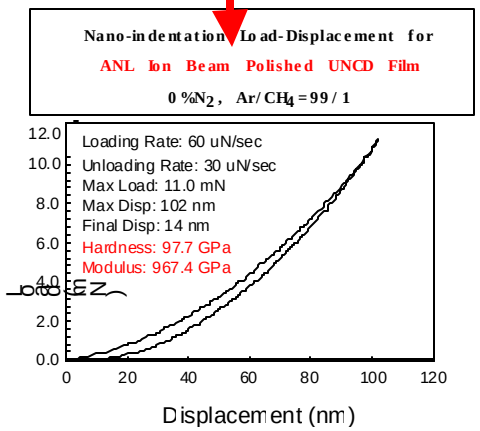
UNCD mechanical and tribological properties are ideally suited for a new UNCD-based MEMS technology







UNCD films are much smoother than MCD films, resulting in much lower friction coefficient and wear



UNCD films exhibit extremely High hardness (~97 GPa)